

RFP-MCC-2621 Addendum #1

To All Bidders of RFP-MCC-2621:

Please note: the following addendum applies to RFP-MCC-2621 and shall be taken into consideration when preparing bid documents.

The following questions have been raised:

- 1. A number of contractors have expressed a desire for an extension of both the date for closing and the occupancy date. In light of those requests the new closing and occupancy dates are:**

Closing of RFP: December 2nd, 2026 at 2:00 pm

Occupancy: October 15th, 2027

- 2. Request to expand the building size:**

The "suggested" building size in the RFP is not a requirement, but intended to be a reflection of what the municipality had in mind. It is anticipated that the proponent will determine the required size of the building.

- 3. Sizes of existing vehicles:**

This information will be forthcoming in the next few days.

- 4. Required clear height within the apparatus bay**

Eighteen Feet (18)

- 5. Geotechnical Report**

Attached to this Addendum

- 6. Topographic Survey**

There is no topographic survey

- 7. Water test and flow test on existing well**

The municipality will conduct these tests and distribute the results within the next week

- 8. Electrical Service and Connection to municipal sewer**

These will be the responsibility of the contractor

- 9. Radio Antennae**

The contractor will be responsible for moving the existing radio antennae to the new building

10. Washable surface on bay walls

The municipality would like to have a washable surface on the bay walls

11. Gear racks

The gear racks (approximately 30 – but will confirm the number) can be located in the apparatus bay

12. Price

The RFP discloses the funds approved by Council for this project. A price that exceeds the amount disclosed in the RFP does not disqualify a proponent. The preferred proponent will be the proponent that scores highest on the evaluation matrix. If that proponent's price exceeds the approved budget the municipality may go back to Council and ask for an increase in the budget or may refuse to award the contract.

A signed copy of each Addendum must also be included with the bid submission. Failure to include this Addendum may be cause for rejection. If you have any questions, please contact Shelby Hum at shelbyhum@cumberlandcounty.ns.ca

ALL OTHER SPECIFICATIONS, TERMS AND CONDITIONS REMAIN UNCHANGED.

Acknowledgement by Bidder:

Company Name: _____

Print Name: _____

Signed: _____

Date: _____



GEMTEC

www.gemtec.ca

**Geotechnical Investigation
New Fire Hall
1495 NS-242**

River Hebert, Nova Scotia

GEMTEC Project: 103744.004

experience • knowledge • integrity



expérience • connaissance • intégrité



GEMTEC

www.gemtec.ca

Submitted to:

Municipality of Cumberland County
1395 Blair Lake Road.
Amherst, Nova Scotia
B4H 3Z5

**Geotechnical Investigation
New Fire Hall
1495 NS-242**

River Hebert, Nova Scotia

July 28, 2026
GEMTEC Project: 103744.004

GEMTEC Consulting Engineers and Scientists Limited
11 Cooke Drive
Moncton, NB, Canada
E1E 0J1

July 28, 2026

File: 103744.004 – Rev0

Municipality of Cumberland County
1395 Blair Lake Road.
Amherst, Nova Scotia
B4H 3Z5

Attention: Allen Cole, BA, JD – Director of Protective Services

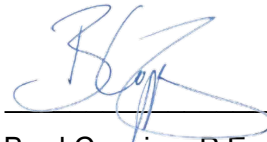
**Re: Geotechnical Investigation – New Fire Hall
1495 NS-242, River Hebert, Nova Scotia**

Enclosed is the geotechnical investigation report for the newly proposed fire hall to be located at 1495NS-242 in River Hebert, Nova Scotia. This report was prepared by Shannon Butland, EIT, and reviewed by Brad Copping, P.Eng.

Please do not hesitate to contact the undersigned if you have any questions or require additional information.



Shannon Butland, EIT
Geotechnical Engineer-in-Training (NB)



Brad Copping, P.Eng.
Senior Materials Engineer (NS)

SB/MB

Enclosures
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1.0 INTRODUCTION

1.1 Project Description

GEMTEC Consulting Engineers and Scientists Limited (GEMTEC) was retained by the Municipality of Cumberland County (the Client) to complete a geotechnical investigation for the proposed fire hall located at 1495 NS-242 in River Hebert, Nova Scotia. The report presented herein summarizes the geotechnical findings and recommendations.

Based on information provided by the Client, we understand that the development will consist of a new fire hall building located to the east of the existing fire hall. Exterior at-grade asphalt parking areas, driveways and support infrastructure such as concrete sidewalks and landscaped areas are also anticipated.

GEMTEC was not provided with detailed foundation plans; therefore, for the purpose of this report, we assume the building will be founded on conventional strip / spread footings and a concrete slab-on-grade with a finished floor elevation closely matching the existing site grades. We assume the new building will have no underground levels. Exterior support infrastructure such as at-grade asphaltic concrete driveway and parking areas, concrete sidewalks, and landscaped areas are also anticipated.

We also understand that there is a network of historical abandoned mine openings (AMOs) in the River Hebert area. As such the Client has requested a desktop study to review the location of historical AMOs in the area as well as a geotechnical borehole investigation to support the design of the proposed fire hall.

The purpose of this investigation was to identify the subsurface conditions and provide engineering recommendations on the geotechnical design aspects of the project based on the factual information obtained. This report presents the findings for geotechnical purposes only. The investigation outlined in this report is strictly geotechnical in nature and should not be viewed as an environmental assessment of the site or in any other manner. This report is subject to GEMTEC's report conditions and limitations, presented in Appendix A, which form an integral part of this report.

1.2 Site Description

The site is located at 1495 NS-242 in River Hebert, Nova Scotia, and is identified by Access Nova Scotia (ANS) as Property Identifier (PID) 25058561. The site covers an approximate surface area of 10,000 square metres (m²) and is bordered to the east and west by residential dwellings, to the north by wood covered land and to the south by NS-242.

The site topography is generally flat across the site. Ground surface elevations within the investigation boundaries range from 26.4 metres (m) to 27.3 m, with reference to the Canadian

Geodetic Vertical Datum of 2013 (CGVD2013). The site is currently occupied by the existing River Hebert Fire Hall. A plan view map of the site is included in Appendix B.

1.3 Coordinate, Datum and Unit Systems

All coordinates provided in this report are referenced to the North American Datum of 2010 (NAD83 (CSRS)). All vertical elevations in this report are referenced to CGVD2013.

This report is presented using the International System of Units (SI), where length is described in m, force in newtons (N), and pressure in pascals (Pa). Kilonewtons (kN) are used to describe large quantities of force, whereas kilopascals (kPa), megapascals (MPa), and gigapascals (GPa) are used to describe large quantities of pressure or stiffness. Centimeters (cm) and millimeters (mm) are used to describe small quantities of length as appropriate, and kilometers (km) are used for large quantities of length.

2.0 BACKGROUND REVIEW

2.1 Surficial Geology

Based on publicly available mapping (Utting, D.J., 2011), the surficial geology at the site is generally comprised of a Wisconsinian aged silty till plain and drumlins. The surficial geology is described as silty, compact, till derived from local and distant sources, with drumlin facies of silty till with a higher percentage of distant source material including red clay.

2.2 Bedrock Geology

Based on publicly available bedrock geology mapping (White, C.E. MacDonald, M.A., and Horne, R.J., 2014), the site is underlain by the Joggins Formation, a subgroup of the Cumberland Group, deposited in the Late Carboniferous period. The Joggins Formation can be described as floodplain mudstone, minor sandstone, coal, lacustrine limestone and Shale.

2.3 Abandoned Mine Openings (AMO)

A desktop review of The Nova Scotia Abandoned Mine Openings (AMO) Database was carried out for the site to assess the potential for historical AMOs in the proposed development area. Based on the review of publicly available AMO maps, specifically tile 21H/9C, the nearest mapped AMO is approximately 340 m north of the site.

3.0 SCOPE OF WORK

3.1 Fieldwork

A total of 6 boreholes (BH26-01 to BH26-06) were advanced at the site on June 23, 2026. Boreholes were advanced along the proposed building footprint and the proposed parking areas to depths ranging from 2.1 m to 6.1 m below the existing surface grade. All boreholes were advanced in the presence of GEMTEC geotechnical personnel.

The boreholes were advanced using a subcontracted track mounted drill rig operated by Meg Drilling Ltd. During borehole advancement, overburden soil samples were collected by GEMTEC personnel and local soil stratigraphy was visually catalogued throughout the investigation. GEMTEC personnel observed and noted the compactness of the soil during borehole advancement.

Descriptive terms used and detailed borehole logs are presented in Appendix C and select site photos are presented in Appendix D.

3.2 Site Survey

Borehole locations and elevations were surveyed using a high precision GPS unit. Elevations referenced in this report and on the attached logs were referenced to the Nova Scotia Active Control Network Monument AMHT with a published elevation of 56.482 m with reference to CGVD 2013.

4.0 SUBSURFACE CONDITIONS

4.1 General

The soil stratigraphy presented in the attached borehole logs are representative of subsurface conditions at the specific borehole locations only. Boundaries between soil zones on the logs are often not distinct but rather are transitional and have been interpreted. Subsurface conditions at locations other than the borehole locations may vary from the conditions reported in the borehole logs.

The soil descriptions in this report are based on commonly accepted methods of classification and identification employed in geotechnical practice. Classification and identification of soil involves judgement and GEMTEC does not guarantee descriptions as exact but infers accuracy to the extent that is common in current geotechnical practice.

The groundwater conditions described in this report refer only to those observed at the place and time of observation noted in the report. Groundwater conditions may vary seasonally or after periods of precipitation and construction activities at or near the site. No monitoring wells were installed as part of this investigation.

4.2 Subsurface Summary

The soil conditions encountered during this geotechnical investigation generally consisted of surficial root mat or fill material, underlain by glacial till. A deposit of native sand and gravel was encountered below the fill material at BH26-01. Inferred Sandstone bedrock was encountered at all borehole locations, excluding BH26-06. Auger refusal occurred at a depth of approximately 2.1 m below existing ground surface on inferred bedrock or inferred boulder at BH26-06. Groundwater seepage was encountered at three (3) borehole locations at the time of the investigation.

A summary of soil conditions encountered during borehole advancement is outlined in Table 4.1.

Table 4.1: Summary of Subsurface Conditions from 2026 Investigation

Borehole ID	Existing Ground Surface Elevation ⁽¹⁾ (m)	Existing Fill Thickness (m)	Native Soil Thickness (m)	Glacial Till Elevation ⁽¹⁾ (m)	Inferred Bedrock Elevation ⁽¹⁾ (m)	Groundwater Elevation ⁽¹⁾ (m)
BH26-01	+26.8	0.4	0.4	+26.0	+23.4	N/E ³
BH26-02	+27.3	0.1	N/E ³	+27.2	+25.4	+23.6
BH26-03	+27.3	N/E ³	0.1	+27.2	+25.2	+23.6
BH26-04	+26.7	0.3	N/E ³	N/E ³	+24.7	N/E ³
BH26-05	+26.4	N/E ³	0.1	+25.9	+25.9	+22.1
BH26-06	+27.2	N/E ³	0.1	+27.1	N/E ³	N/E ³

(1) Elevations referenced to CGVD2013.

(2) The fill thickness in BH26-04 and native soil thicknesses in the remaining boreholes include an approximately 0.1 m thick root mat encountered at ground surface, excluding BH26-01.

(3) N/E: Not Encountered

4.3 Root Mat

An approximately 0.1 m thick root mat was encountered from ground surface at BH26-03 to BH26-06, which were advance within the existing grass covered areas.

4.4 Fill Material

Variable existing fill was encountered at three (3) borehole locations, two (2) from surface and one (1) below the root mat. The thickness of the existing fill generally ranged from approximately 0.2 m to 0.4 m. The existing fill can generally be described as a compact to dense brown Silty sand and gravel to a grey crushed rock. Coal fragments were also noted within the fill material at BH26-02.

4.5 Native Soil Deposit

An approximately 0.4 m thick deposit of native silty sand and gravel was encountered underlying the surficial fill material at BH26-01. Coal fragments were also observed within the silty sand and gravel.

4.6 Glacial Till

A deposit of glacial till was encountered below the above noted materials at all borehole locations. The glacial till was encountered at depths of about 0.1 m to 0.8 m below existing surface grade (elevations +26.0 m to +27.2 m, CGVD 2013). Glacial till is a heterogeneous mixture of all grain

sizes, but for this site is generally described as brown sandy silt to sand and silt to silt and sand to silty sand and gravel, with varying amounts of gravel.

SPT N-Values recorded throughout the till deposit varied from 6 blows to 26 blows, indicating a loose to compact compactness condition. In one instance, the split spoon sample did not penetrate the full SPT depth due to refusal (i.e., >50 blows per 0.15 m) on inferred cobble (and possible boulder) obstructions. Based on our experience, cobbles and boulders should also be expected within glacially derived till deposits.

4.7 Inferred Sandstone Bedrock

Inferred Sandstone bedrock was encountered below the native glacial till at five (5) borehole locations at depths ranging from approximately 0.5 m to 3.4 m below existing ground surface (elevation +23.4 m to +25.9 m, CGVD2013).

4.8 Groundwater Seepage

Groundwater seepage was encountered at three (3) borehole locations at depths ranging from 3.7 m to 4.3 m below ground surface (elevations +22.1 m to +23.6 m, CGVD 2013) at the time of the investigation. The groundwater conditions described in this report refer only to those observed at the locations and date of observation noted in the report and on the borehole logs. Groundwater levels would be expected to fluctuate seasonally, and in response to precipitation events, and construction activities at or near the site. Shallow groundwater seepage may also be locally affected by the presence of underground utility corridors.

4.9 Laboratory Testing

Laboratory index testing was undertaken on three (3) representative soils samples. Laboratory testing results are summarized in Table 4.2. Detailed test results are included in Appendix D.

Table 4.2: Summary of Laboratory Testing Results

Borehole ID and Sample Number	Sample Depth (metres)	Sample Moisture Content (%)	Gravel Content (%)	Sand Content (%)	Silt and Clay Content (%)
BH26-01, S4	2.1 – 2.7	20.3	19.4	24.0	56.6
BH26-01, S5	3.1 – 3.7	9.5	18.3	43.9	37.8
BH26-03, S3	1.5 – 2.1	13.6	9.8	40.3	49.8

5.0 DISCUSSION AND CONCLUSIONS

Based on the subsurface conditions encountered at the borehole locations, it is our opinion that the site is suitable for the proposed development provided that all fill materials and otherwise loose, water-softened or deleterious materials are removed from the proposed building footprint's zone of influence, and the recommendations outlined in this report are followed.

Based on information provided by the Client, we understand that the development will consist of a new fire hall building located to the east of the existing fire hall. Exterior at-grade asphalt parking areas, driveways and support infrastructure such as concrete sidewalks and landscaped areas are also anticipated.

GEMTEC was not provided with detailed foundation plans; therefore, for the purpose of this report, we assume the building will be founded on conventional strip / spread footings and a concrete slab-on-grade with a finished floor elevation closely matching the existing site grades. We assume the new building will have no underground levels. Exterior support infrastructure such as at-grade asphaltic concrete driveway and parking areas, concrete sidewalks, and landscaped areas are also anticipated.

Auger refusal occurred at BH26-06 at approximately 2.1 m below ground surface (elevation +25.2m, CGVD 2013) at the time of the investigation on inferred bedrock or large boulders. Bedrock was also encountered at all other borehole locations at depths ranging from 0.5 m to 3.4 m (elevations +23.4 m to +25.9 m, CGVD 2013). Bedrock excavation or removal of large boulders may be required within the building footprint and for the installation of subsurface utilities.

It is recommended that the foundation and civil site design drawings be reviewed by GEMTEC as the design progresses to ensure that the guidelines provided in this report have been interpreted as intended.

6.0 GEOTECHNICAL RECOMMENDATIONS AND GUIDELINES

6.1 General

This section of the report provides engineering guidelines on the geotechnical design and construction aspects of the project based on our interpretation of the borehole information and the project requirements. The information in the following sections is provided for the guidance of the designers and is intended for this project only. Contractors bidding on or undertaking the works should examine the factual results of the investigation, satisfy themselves as to the adequacy of the information for construction, and make their own interpretation of the factual data as it affects their construction techniques, schedule, safety, and equipment capabilities.

The boreholes advanced at the site were widely scattered; therefore, subsurface conditions between boreholes may vary from those determined at the borehole locations. **GEMTEC personnel should be contacted immediately if the subsurface conditions encountered**

during excavations differ from those encountered during the completion of our geotechnical investigation.

6.2 Earthworks

Earthworks for this project will include the following:

- Removal of fill material and otherwise loose, water-softened or deleterious materials from within the zone of influence of the proposed buildings.
- Bedrock excavation within the building footprint and utility trenches.
- Excavation for footings and underground infrastructure.
- Placement and compaction of structural fill materials, as required.
- General site grading.

Loose or weak zones identified from subgrade assessments should be repaired with materials approved by the Geotechnical Engineer or their representative.

6.2.1 Excavations and Dewatering

- Prior to excavations, surface water drainage controls should be provided on the up-gradient portions of the site to minimize runoff onto exposed soils. Suitable erosion and sedimentation control measures should be employed. These may include silt fences, check dams in ditches, and granular working pads.
- Groundwater seepage was encountered during the investigation; therefore, dewatering may be required during excavation and backfilling operations. Dewatering can likely be achieved with the use of trenches and a sump and pump system. Sumps should be located so as not to interfere with the future placement of structural fill materials and / or foundations.
- Within the zone of influence of the proposed building, any fill material and otherwise loose, deleterious or water-softened soils should be removed to expose clean bedrock. Excavations shall extend beyond the edge of the footings a minimum distance of 0.5 m, plus any additional area required to construct a one vertical to one horizontal (1V:1H) splay of engineered fill down to suitable bearing soils (i.e., clean bedrock).

6.2.2 Bedrock Excavation

Based on existing and proposed site grades, bedrock removal may be required in certain areas of the site to provide a level development area and for foundation and underground service installation.

Depending on the quality and strength of the bedrock, bedrock removal may be achieved with the use of excavator equipped with tooth or ripping buckets, or with the use of hydraulic breakers

and/or blasting in zones of more competent bedrock. The contractor should familiarize themselves with the anticipated bedrock conditions and provide appropriate equipment.

Prior to and during construction, the contractor should closely monitor adjoining buildings and roadways for signs of undermining, movement, or excessive vibrations caused by earthworks activities, bedrock breaking, or blasting.

Without further information on the bedrock type, quality, weathering state and fracturing spacing/orientation, for planning purposes all trenches within the bedrock should be no steeper than one horizontal to one vertical (1H:1V) to within 1.2 metres of the bottom of the trench, as per NS OH&S regulations. Steeper cuts (i.e. near vertical) may be feasible in good quality bedrock, whereas flatter slopes (i.e. 2H:1V) may be required in zones of highly fractured and weathered rock. A geotechnical engineer should further assess the bedrock quality and excavation requirements as design and construction progresses.

6.2.3 Fill Placement and Compaction

- **Structural fill** placement limits should extend beyond the edge of the footings a minimum distance of 0.5 m before sloping down at a slope of 1H:1V to suitable bearing soils (i.e., clean bedrock).
- Structural fill should be an approved aggregate material such as NSDPW Type 1 or 2 Gravel.
- The lift thickness used during placement of fill must be compatible with the compaction equipment and the material type to ensure the specified density is achieved throughout. Typically, lift thicknesses should not exceed 450 mm in loose thickness for mass filling, and 300 mm in loose thickness for fill used within foundation, concrete slab-on-grade, trenching, and parking/roadway areas.
- Structural fill should be compacted to the appropriate percentages of the Standard Proctor Maximum Dry Density (SPMDD) as determined by the latest version of ASTM D698 (Standard Proctor), presented in Table 6.1. Compaction should be verified in the field with a nuclear density gauge on a regular basis. The maximum particle size should be no larger than $\frac{2}{3}$ of the lift thickness.
- Foundation wall backfill should be a clean granular material having less than 10% fines (i.e., less than 10% passing the 0.080-mm sieve size) to avoid frost adhesion and possible heaving. Material meeting the NSDPW Type 1 or 2 Gravel standards, or an approved alternate, would be suitable foundation wall backfill material.
- Exterior perimeter foundation wall backfill should be placed in maximum 300 mm thick lifts and should be compacted to at least 95% of the SPMDD value using suitable vibratory compaction equipment.

Table 6.1: Summary of Compaction Requirements

Structural Fill Use	Required Percentage of Compaction
Fill underneath footings and below-grade concrete slab	98%
Foundation wall backfill	95%
Pavement structure base and subbase, granular pipe bedding/cover, and imported fill below concrete areas	98%
Borrow fill underneath pavement structure and service trench backfill	95%
Landscape areas	90%

6.2.4 Frost Protection

All footings for heated structures should be provided with at least 1.2 m (estimated frost penetration depth) of conventional soil cover after final grading to minimize the potential for damage due to frost action. For isolated, unheated footings the design frost depth should be taken as 1.5 m. Alternatively, footing depths may be reduced if an insulation detail is incorporated in the design.

To mitigate impacts from frost adhesion and heaving on foundation walls, the excavated areas behind foundation walls or retaining walls should be backfilled with non-frost susceptible granular material conforming to the requirements of NSDPW Type 1 or 2 Gravel or approved alternative.

In areas where pavement or other hard surfacing will abut the building, differential frost heaving could occur between the granular fill immediately adjacent to the building and the more frost-susceptible existing fill materials which exist beyond the foundation wall backfill. To reduce the severity of this differential heaving, the backfill adjacent to the wall should be placed to form a frost taper. The frost taper should be brought up to pavement subgrade level from 1.2 m below finished exterior grade at a slope of 3H:1V, or flatter, away from the wall. Non-frost susceptible granular backfill materials should be placed evenly in lifts not exceeding 200 mm in loose thickness, uniformly compacted to at least 95% SPMDD. The exterior grade should also be shaped to slope away from the building.

6.3 Utilities

The following subsections are provided in the event new services are installed as part of the proposed development.

6.3.1 General

The existing fill soils on the site are generally considered to be suitable for supporting the underground services provided that: (i) the integrity of the fill at the base of the trench excavations is maintained during construction and (ii) a minimum 0.5-m thick bedding layer is constructed below the invert of the utilities. Where softened, disturbed, or other deleterious materials are encountered at the base of excavations; or where lack of proper dewatering/groundwater control results in base heave or disturbance of the soils at the base of the trench, these materials should be sub-excavated and replaced with compacted fills, placed in-the-dry, and approved by the Geotechnical Engineer.

Due to the general proximity to bedrock, deeper excavations for service trenches may prove to be difficult, particularly below a highly weathered upper portion of the bedrock. The contractor should familiarize themselves with the anticipated subsurface conditions and provide adequate equipment to perform the work.

6.3.2 Trenching and Support

Trenches should be excavated in accordance with the requirements of the Nova Scotia Occupational Health and Safety Division requirements including having a 1H:1V slope within the first 1.2 m from the bottom of the trench. Excavation work for the service trenches should be carried out in dry weather using a straight edge ditching bucket to minimize soil disturbance.

Where a trench liner box is used, any gaps between the exterior of the liner box and the excavation wall should be filled immediately to restore lateral support and reduce ground movements. It is imperative that any underground services or existing structures adjacent to the trench excavations be accurately located prior to construction and adequate support provided where required. Steepened excavations should only be left open for as short of a duration as possible and completely backfilled at the end of each working day.

If utility excavations are shallow, groundwater control measures may predominantly include pumping from properly filtered sumps located within and/or below the base of the trench as required based on the subsurface conditions. If deep utility excavations are planned, additional groundwater control efforts may be required during utility installation.

6.3.3 Pipe Bedding and Cover

All loose existing fill, or otherwise disturbed materials should be removed from the trench subgrade to expose competent founding stratum prior to placement of the bedding material. The trench subgrade should be reviewed and confirmed by qualified Geotechnical personnel prior to fill placement. Any sub-excavated areas should be replaced with suitably compacted bedding material.

6.3.4 Trench Backfill

It is assumed that the utility alignments will underlie paved areas; therefore, it will be necessary to limit the magnitude of trench backfill settlement.

It is recommended that imported granular materials be used as trench backfill (e.g., NSDPW Type 1 or Type 2 Gravel). Backfill should be placed in maximum 300-mm thick loose lifts and compacted to at least 98% SPMDD to reduce potential post-construction settlements.

For frost compatibility in areas underlying pavement, the trench backfill materials between the design frost penetration depth (i.e., 1.5 m) and the underside of pavement subbase or base should generally match the exposed material on the trench sidewalls.

6.4 Foundations

- The proposed building may be supported on conventional strip and spread footings founded directly on clean bedrock or properly compacted structural fill built up from this layer.
- **For preliminary design purposes**, shallow foundations bearing on approved strata as noted above may be sized using a geotechnical resistance of 150 kPa at Serviceability Limit State (SLS), for anticipated post-construction total and differential settlements of 25 mm and 19 mm, respectively. For design purposes, a factored geotechnical resistance of 300 kPa at Ultimate Limit States (ULS) may be used.
- The above bearing capacities assume concentric loads and no foundation inclination.
- **SLS and ULS bearing capacities are based on several factors, including the foundation type and dimensions, burial depth, the amount of grade raise, and the position of the groundwater table. GEMTEC should assess the final bearing capacity values once final design details are available.**
- GEMTEC should assess foundation subgrade conditions to ensure that satisfactory bearing materials have been reached prior to constructing footings and / or placing structural fill materials.
- Finished surface grades adjacent to foundations should be sloped away from the foundations at a 2% grade for a minimum distance of 3 m. These areas should be capped with an impervious material, such as asphaltic concrete or impermeable soil.

6.5 Seismic Site Classification

In the absence of in-situ shear wave velocity measurements per Sentence 4.1.8.4 (3) of the 2020 National Building Code of Canada (NBCC 2020), foundations may be designed using a Seismic Site Class D as per Table 4.1.8.4.-B.

6.6 Concrete Slab-on-Grade

The concrete slab-on-grade should be excavated down to clean bedrock, removing any fill material and otherwise deleterious material. Before constructing the slab or importing any structural fill materials, the exposed subgrade should be approved by a qualified Geotechnical Engineer. All fill required to raise the grade within the concrete slab area should consist of imported granular fill placed and compacted as per Subsection 6.2.2.

A typical interior below-grade concrete slab detail is provided below:

- Concrete slab.
- Vapour barrier in accordance with CSA A23.1-14, Clause 6.2.5.
- Minimum 150-mm-thick layer of NSDPW Type 1 Gravel base material or 20-5 mm graded clear drainage stone.
- Approved structural fill (as per Subsection 6.2.2, if required).
- Approved subgrade.

Note that the above detail does not account for radon gas mitigation measures that may be required by NBCC 2020. If this is a requirement, this detail should be modified accordingly.

6.7 Pavement Structure

For preliminary design purposes, Table 6.2 provides typical details for pavement structures for road and asphalt areas on the site. These typical pavement designs should be confirmed by GEMTEC, if specific traffic data for each drive lane becomes available.

Table 6.2: Typical Details for Asphalt Pavement Structures

Paved Area	Subgrade Type	Asphalt		Roadbed Gravels ⁽¹⁾	
		Top Lift	Base Lift	Type 1 Gravel	Type 2 Gravel
Light Duty (Parking)	Clean Bedrock, Compact Rock Fill ⁽²⁾ or Engineered Fill	70 mm C-HF	–	150 mm	300 mm

Paved Area	Subgrade Type	Asphalt		Roadbed Gravels ⁽¹⁾	
		Top Lift	Base Lift	Type 1 Gravel	Type 2 Gravel
Heavy Duty (Fire Lanes and Truck Routes)	Clean Bedrock, Compact Rock Fill ⁽²⁾ or Engineered Fill	40mm C-HF	50mm B-HF	150 mm	300 mm

(1) Gravel types as per *NSDPW Standard Specification*. Roadbed gravels (subbase/base) should be compacted to 98% SPMDD. Prior to placing the granular subbase and/or base courses within pavement areas, the surface of the engineered fill/subgrade should be reviewed by qualified Geotechnical personnel.

(2) Compact rock fill subgrade should be proof rolled with suitable equipment, in conjunction with review by qualified Geotechnical personnel to assess that the exposed soils are competent and free of ponded water.

To preserve the integrity of the paved areas, a permanent roadway drainage system is recommended. As this is in an urban area, subdrains should be installed along the new edge of pavement immediately below the proposed subgrade elevation, as well as a system of catch basins draining to storm sewers. In this regard, the subgrade should be carefully proof-rolled to a smooth surface and sloped towards the subdrains to prevent ponding or entrapment of water in the subbase, which would lead to premature deterioration of the pavement.

In areas where drainage of surface water and subsurface water in the granular roadbed is feasible due to a free downslope area, crossfall of 1.5 to 2% should be provided along the subgrade surface, gravel surface, and paved surface in order to drain water away from the paved elements.

The subgrade should be proof-rolled and inspected by Geotechnical personnel prior to placing the subbase and any additional material, as required, consistent with the prevailing weather conditions and anticipated use by construction traffic.

6.8 Exterior Slabs or Sidewalks

Sidewalks or exterior slabs, if any, next to the building should be protected from frost heaving by installing rigid insulation.

6.9 Construction Inspection and Monitoring

The engagement of the services of a Geotechnical Consultant during construction is recommended to confirm the subsurface conditions throughout the proposed excavations do not materially differ from those given in the report and that the construction activities do not adversely affect the intent of the design. The subgrade surfaces for the proposed development should be assessed by experienced geotechnical personnel to ensure that suitable materials have been reached and properly prepared. The placing and compaction of earth fill and imported granular materials should be assessed to ensure that the materials used conform to the grading and compaction specifications. Once the design has been finalized, GEMTEC should be retained to review the drawings to ensure that our recommendations have been interpreted correctly.

Prior to construction, a pre-construction kick-off meeting should be held with all stakeholders, including the owner, designer, Geotechnical Engineer, testing agency, earthworks site superintendents and contractor representatives to establish earthworks quality control procedures and to ensure the recommendations outlined in this report are understood and applied during earthworks activities.

6.10 Winter Construction

Placing frozen fill or engineered fill on frozen subgrade is not recommended. If work is to be undertaken during freezing conditions, care should be taken to heat and / or insulate the fill and subgrade soils prior to and after placement to keep them from freezing (some typical measures include heated box trucks, insulated tarps, or bales of hay). Frozen subgrade soil and / or previously placed fill must be thawed or removed prior to placement of any engineered fill. Winter concrete work should be carried out in accordance with CSA A23.

Any service trenches should be opened for as short a time as practicable and the excavations should be carried out only in lengths which allow the construction operations, including backfilling, to be fully completed in one working day.

7.0 CLOSURE

This report has been prepared for the sole benefit of our client, Municipality of Cumberland County. The report may not be relied upon by any other person or entity without the express written consent of both GEMTEC and our client, Municipality of Cumberland County.

Any use that a third party makes of this report, or any reliance or decisions made based on it, is the responsibility of such third parties. GEMTEC accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

We trust this report provides sufficient information for your present purposes. If you have any questions concerning this report, do not hesitate to contact our office.



Brad Copping, P.Eng.
Senior Materials Engineer

Shannon Butland, EIT
Geotechnical Engineer-in-Training

8.0 REFERENCES

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- Canadian Geotechnical Society (CGS). 2023. Canadian Foundation Engineering Manual. 5th Edition.
- Canadian Standards Association (CSA). 2024. CSA A.23.1:24 Concrete Materials and Methods of Concrete Construction. Standards Council of Canada.
- National Research Council of Canada (NRCC). 2020. National Building Code of Canada, Volume 1 and 2 (Fifteenth edition).
- Utting, D.J. (2011). Surficial Geology Map, Part of the Halifax Claim Reference Sheet 11D/12D, Halifax County, Nova Scotia, Open File Map ME 2011-009, Nova Scotia Department of Natural Resources Mineral Resources Branch, Scale 1:25 000.
- White, C.E., MacDonald, M.A., and Horne, R.J. (2014). Bedrock Geology Map of the Halifax Area, NTS 11D/12, Halifax County, Nova Scotia, Open File Map ME 2014-010, Nova Scotia Department of Natural Resources Geoscience and Mines Branch, Scale 1:50 000.
- Nova Scotia Department of Natural Resources and Renewables. (2024). Abandoned Mine Openings Database. Geoscience and Mines Branch.
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APPENDIX A

Report Conditions and Limitations

Conditions and Limitations of This Report

1. **Standard of Care:** GEMTEC has prepared this report in a manner consistent with generally accepted engineering or environmental consulting practice in the jurisdiction in which the services are provided at the time of the report. No other warranty, expressed or implied is made.
2. **Copyright:** The contents of this report are subject to copyright owned by GEMTEC, save to the extent that copyright has been legally assigned by us to another party or is used by GEMTEC under license. To the extent that GEMTEC owns the copyright in this report, it may not be copied without our prior written agreement for any purpose other than the purpose indicated in this report. The methodology (if any) contained in this report is provided to the Client in confidence and must not be disclosed or copied to third parties without the prior written agreement of GEMTEC. Disclosure of that information may constitute an actionable breach of confidence or may otherwise prejudice our commercial interests.
3. **Complete Report:** This report is of a summary nature and is not intended to stand alone without reference to the instructions given to GEMTEC by the Client, communications between GEMTEC and the Client and to any other reports prepared by GEMTEC for the Client relative to the specific site described in the report. In order to properly understand the suggestions, recommendations and opinions expressed in this report, reference must be made to the whole of the report. GEMTEC can not be responsible for use of portions of the report without reference to the entire report.
4. **Basis of Report:** This Report has been prepared for the specific site, development, design objectives and purposes that were described to GEMTEC by the Client. The factual data, interpretations and recommendations pertain to a specific project as described in this report and are not applicable to any other project or site location. The applicability and reliability of any of the findings, recommendations, suggestions, or opinions expressed in the document, subject to the limitations provided herein, are only valid to the extent that this report expressly addresses the proposed development, design objectives and purposes. Any change of site conditions, purpose or development plans may alter the validity of the report and GEMTEC cannot be responsible for use of this report, or portions thereof, unless GEMTEC is requested to review any changes and, if necessary, revise the report.
5. **Time Dependence:** If the proposed project is not undertaken by the Client within 18 months following the issuance of this report, or within the timeframe understood by GEMTEC to be contemplated by the Client, the guidance and recommendations within the report should not be considered valid unless reviewed and amended or validated by GEMTEC in writing.
6. **Use of This Report:** The information, recommendations and opinions expressed in this report are for the sole benefit of the Client. No other party may use or rely on this report or any portion thereof without GEMTEC's express written consent. If the report was prepared to be included for a specific permit application process, then upon the reasonable request of the client, GEMTEC may authorize in writing the use of this report by the regulatory agency as an Approved User for the specific and identified purpose of the applicable permit review process.

Contractors bidding on, or undertaking the work, should rely on their own investigations, as well as their own interpretations of the factual data presented in the report, as to how subsurface conditions may affect their work, including but not limited to proposed construction techniques, schedule, safety and equipment capabilities.
7. **No Legal Representations:** GEMTEC makes no representations whatsoever concerning the legal significance of its findings, or as to other legal matters touched on in this report, including but not limited to, ownership of any property, or the application of any law to the facts set forth herein. With respect to regulatory compliance issues, regulatory statutes are subject to interpretation and change. Such interpretations and regulatory changes should be reviewed with legal counsel.

8. **Decrease in property value:** GEMTEC shall not be responsible for any decrease, real or perceived, of the property or site's value or failure to complete a transaction, as a consequence of the information contained in this report.
9. **Reliance on Provided Information:** The evaluation and conclusions contained in this report have been prepared on the basis of conditions in evidence at the time of site inspections and on the basis of information provided to us. We have relied in good faith upon representations, information and instructions provided by the Client and others concerning the site. Accordingly, we cannot accept responsibility for any deficiency, misstatement or inaccuracy contained in this report as a result of misstatements, omissions, misrepresentations, or fraudulent acts of the Client or other persons providing information relied on by us. We are entitled to rely on such representations, information and instructions and are not required to carry out investigations to determine the truth or accuracy of such representations, information and instructions.
10. **Investigation Limitations:** Site investigation programs are a professional estimate of the scope of investigation required to provide a general profile of subsurface conditions but even a comprehensive investigation, sampling and testing program may fail to detect all or certain subsurface conditions.

The data derived from the site investigation program and subsequent laboratory testing are interpreted by trained personnel and extrapolated across the site to form an inferred geological representation and an engineering opinion is rendered about overall subsurface conditions and their likely behaviour with regard to the proposed development. Conditions between and beyond the borehole/test hole locations may differ from those encountered at the borehole/test hole locations and the actual conditions at the site might differ from those inferred to exist, since no subsurface exploration program, no matter how comprehensive, can reveal all subsurface details and anomalies. Accordingly, GEMTEC does not warrant or guarantee the exactness of the subsurface descriptions.

Soil and groundwater conditions shown in the factual data and described in the report are the observed conditions at the time of their determination or measurement. Unless otherwise noted, those conditions form the basis of the recommendations in the report. Groundwater conditions may vary between and beyond reported locations and can be affected by annual, seasonal and meteorological conditions. The condition of the soil, rock and groundwater may be significantly altered by construction activities (traffic, excavation, groundwater level lowering, pile driving, blasting, etc.) on the site or on adjacent sites. Excavation may expose the soils to changes due to wetting, drying or frost. Unless otherwise indicated the soil must be protected from these changes during construction.

In addition, fill of variable physical and chemical composition can be present over portions of the site or on adjacent properties. The professional services retained for this project include only the geotechnical aspects of the subsurface conditions at the site, unless otherwise specifically stated and identified in the report. The presence or implication(s) of possible surface and/or subsurface contamination resulting from previous activities or uses of the site and/or resulting from the introduction onto the site of materials from off-site sources are outside the terms of reference for this project and have not been investigated or addressed.

11. **Sample Disposal:** GEMTEC will dispose of all uncontaminated soil and/or rock samples 60 days following issue of this report or, upon written request of the Client, will store uncontaminated samples and materials at the Client's expense. In the event that actual contaminated soils, fills or groundwater are encountered or are inferred to be present, all contaminated samples shall remain the property and responsibility of the Client for proper disposal.
12. **Follow-Up and Construction Services:** All details of the design were not known at the time of submission of GEMTEC's report. GEMTEC should be retained to review the final design, project plans and documents prior to construction, to confirm that they are consistent with the intent of GEMTEC's report.

During construction, GEMTEC should be retained to perform sufficient and timely observations of encountered conditions to confirm and document that the subsurface conditions do not

materially differ from those interpreted conditions considered in the preparation of GEMTEC's report and to confirm and document that construction activities do not adversely affect the suggestions, recommendations and opinions contained in GEMTEC's report. Adequate field review, observation and testing during construction are necessary for GEMTEC to be able to provide letters of assurance, in accordance with the requirements of many regulatory authorities. In cases where this recommendation is not followed, GEMTEC's responsibility is limited to interpreting accurately the information encountered at the borehole locations, at the time of their initial determination or measurement during the preparation of the Report.

13. **Changed Conditions:** Where conditions encountered at the site differ significantly from those anticipated in this report, either due to natural variability of subsurface conditions or construction activities, it is a condition of this report that GEMTEC be notified of any changes and be provided with an opportunity to review or revise the recommendations within this report. Recognition of changed soil and rock conditions requires experience and it is recommended that GEMTEC be employed to visit the site with sufficient frequency to detect if conditions have changed significantly.
14. **Drainage:** Drainage of subsurface water is commonly required either for temporary or permanent installations for the project. Improper design or construction of drainage or dewatering can have serious consequences. GEMTEC takes no responsibility for the effects of drainage unless specifically involved in the detailed design and construction monitoring of the system.



APPENDIX B

Borehole Location Plan

N:\Projects\103700\103744.004\06_Civil Drafting\Existing\103744.004_DWG_BH Location Plan_2026-07-20.dwg



Legend

BOREHOLE

PROPERTY LINE

Topographic map 21H09 source GeoGratis (Government of Canada).

1:100000

Note

- Coordinate system: Nova Scotia UTM Zone 20.
- This survey referenced Nova Scotia Active Control Network Monument AMHT, with a published elevation of 56.482 m (CGVD2013).
- Aerial photograph from Google Earth.

Date	JULY 2026	Draw	CBH	Checked	DAM
Project	GEOTECHNICAL INVESTIGATION PROPOSED FIRE HALL DEVELOPMENT 1495 NS-242 RIVER HEBERT, NOVA SCOTIA				
Drawing	BOREHOLE LOCATION PLAN				
Scale	1:500 				
Project No.	103744.004	Drawing No.	1	Revision No.	0

GEMTEC
CONSULTING ENGINEERS
AND SCIENTISTS



APPENDIX C

Descriptive Terms and Borehole Logs

LITHOLOGICAL AND GEOTECHNICAL ROCK DESCRIPTION TERMINOLOGY

WEATHERING STATE	
Fresh	No visible sign of rock material weathering
Faintly weathered	Weathering limited to the surface of major discontinuities
Slightly weathered	Penetrative weathering developed on open discontinuity surfaces but only slight weathering of rock material
Moderately weathered	Weathering extends throughout the rock mass but the rock material is not friable
Completely weathered	Rock is wholly decomposed and in a friable condition but the rock and structure are preserved

CORE CONDITION
Total Core Recovery (TCR) The percentage of solid drill core recovered regardless of quality or length, measured relative to the length of the total core run
Solid Core Recovery (SCR) The percentage of solid drill core, regardless of length, recovered at full diameter, measured relative to the length of the total core run.
Rock Quality Designation (RQD) The percentage of solid drill core, greater than 100 mm length, as measured along the centerline axis of the core, relative to the length of the total core run. RQD varies from 0% for completed broken core to 100% for core in solid segments.

BEDDING THICKNESS	
Description	Thickness
Thinly laminated	< 6 mm
Laminated	6 - 20 mm
Very thinly bedded	20 - 60 mm
Thinly bedded	60 - 200 mm
Medium bedded	200 - 600 mm
Thickly bedded	600 - 2000 mm
Very thickly bedded	2000 - 6000 mm

DISCONTINUITY SPACING	
Description	Spacing
Very close	20 - 60 mm
Close	60 - 200 mm
Moderate	200 - 600 mm
Wide	600 - 2000 mm
Very wide	2000 - 6000 mm

ROCK QUALITY	
RQD	Overall Quality
0 - 25	Very poor
25 - 50	Poor
50 - 75	Fair
75 - 90	Good
90 - 100	Excellent

ROCK COMPRESSIVE STRENGTH	
Comp. Strength, MPa	Description
1 - 5	Very weak
5 - 25	Weak
25 - 50	Moderate
50 - 100	Strong
100 - 250	Very strong

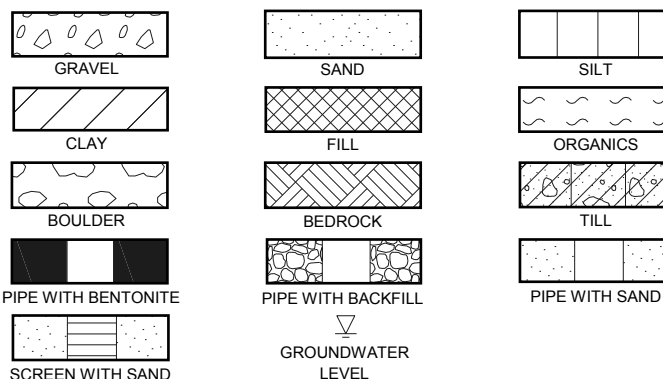
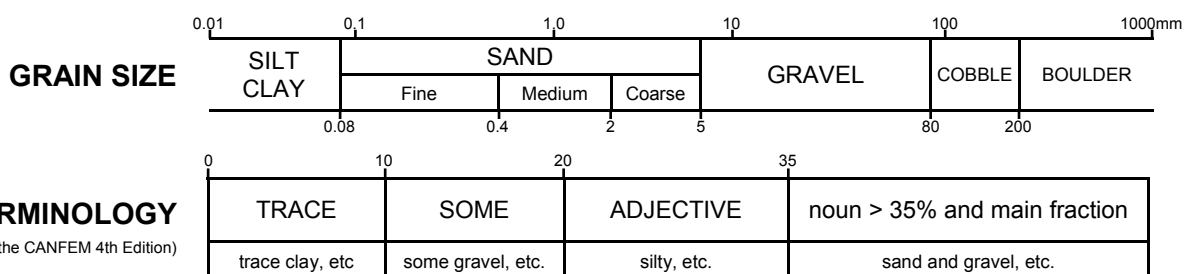
ABBREVIATIONS AND TERMINOLOGY USED ON RECORDS OF BOREHOLES AND TEST PITS

SAMPLE TYPES	
AS	Auger sample
CA	Casing sample
CS	Chunk sample
BS	Borros piston sample
GS	Grab sample
MS	Manual sample
RC	Rock core
SS	Split spoon sampler
ST	Slotted tube
TO	Thin-walled open shelby tube
TP	Thin-walled piston shelby tube
WS	Wash sample

SOIL TESTS	
w	Water content
PL, w_p	Plastic limit
LL, w_L	Liquid limit
C	Consolidation (oedometer) test
D_R	Relative density
DS	Direct shear test
G_s	Specific gravity
M	Sieve analysis for particle size
MH	Combined sieve and hydrometer (H) analysis
MPC	Modified Proctor compaction test
SPC	Standard Proctor compaction test
OC	Organic content test
UC	Unconfined compression test
γ	Unit weight

PENETRATION RESISTANCE	
Standard Penetration Resistance, N The number of blows by a 63.5 kg (140 lb) hammer dropped 760 millimetres (30 in.) required to drive a 50 mm split spoon sampler for a distance of 300 mm (12 in.). For split spoon samples where less than 300 mm of penetration was achieved, the number of blows is reported over the sampler penetration in mm.	
Dynamic Penetration Resistance The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in.) to drive a 50 mm (2 in.) diameter 60° cone attached to 'A' size drill rods for a distance of 300 mm (12 in.).	
WH	Sampler advanced by static weight of hammer and drill rods
WR	Sampler advanced by static weight of drill rods
PH	Sampler advanced by hydraulic pressure from drill rig
PM	Sampler advanced by manual pressure

COHESIONLESS SOIL Compactness		COHESIVE SOIL Consistency	
SPT N-Values	Description	C_u , kPa	Description
0-4	Very Loose	0-12	Very Soft
4-10	Loose	12-25	Soft
10-30	Compact	25-50	Firm
30-50	Dense	50-100	Stiff
>50	Very Dense	100-200	Very Stiff
		>200	Hard



DESCRIPTIVE TERMINOLOGY

(Based on the CANFEM 4th Edition)

RECORD OF BOREHOLE 26-01

CLIENT: Municipality of Cumberland County
 PROJECT: Geotechnical Engineering Services - New Fire Hall
 JOB#: 103744.004
 LOCATION: 1495 NS-242, River Hebert, NS

SHEET: 1 OF 1
 DATUM: CGVD2013
 BORING DATE: Jun 23 2026

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES				PENETRATION RESISTANCE (N), BLOWS/0.3m ▲ DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m	SHEAR STRENGTH (Cu), kPa + NATURAL ⊕ REMOULDED		WATER CONTENT, % W _p — W — W _L	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m						
0	Auger Solid Stem Auger (114mm OD)	Ground Surface		26.80										Borehole loosely backfilled with auger cuttings at the time of the investigation
		Dense, grey, moist, CRUSHED ROCK (FILL)		26.40 0.40	S1	SS	400	32						
		Compact, grey to black, moist, Silty SAND and GRAVEL with coal fragments		26.00 0.80	S2	SS	350	19						
1		Compact, brown, moist, Sandy Silt, some Gravel to Sand and Silt, some Gravel (GLACIAL TILL)												
					S3	SS	400	17						
2														
					S4	SS	500	24					M	
3		Inferred Sandstone BEDROCK		23.40 3.40	S5	SS	525	100+					M	
4		- split spoon refusal at 3.6 mbgs; auger to 4.6 mbgs												
					S6	SS	13	100+						
5		- split spoon refusal at 4.6 mbgs; auger to 6.1 mbgs												
6														
7														
8														
		End of Borehole at 6.1 mbgs		20.70 6.10										

RECORD OF BOREHOLE 26-02

CLIENT: Municipality of Cumberland County
 PROJECT: Geotechnical Engineering Services - New Fire Hall
 JOB#: 103744.004
 LOCATION: 1495 NS-242, River Hebert, NS

SHEET: 1 OF 1
 DATUM: CGVD2013
 BORING DATE: Jun 23 2026

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES				PENETRATION RESISTANCE (N), BLOWS/0.3m DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m	SHEAR STRENGTH (Cu), kPA + NATURAL ⊕ REMOULDED WATER CONTENT, % W _p — W — W _L		ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m					
0	Auger Solid Stem Auger (114mm OD)	Ground Surface		27.30									Borehole loosely backfilled with auger cuttings at the time of the investigation
		Compact, grey, moist, CRUSHED ROCK with coal fragments (FILL)		27.10 0.20	S1	SS	300	12	●				
		Compact, brown, moist, Silty Sand and Gravel (GLACIAL TILL)			S2	SS	600	21	●				
1													
					S3	SS	450	100+				●	
2	Auger Solid Stem Auger (114mm OD)	Inferred Sandstone BEDROCK		25.40 1.90									Borehole loosely backfilled with auger cuttings at the time of the investigation
		- split spoon refusal at 2.1 mbgs; auger to 2.4 mbgs											
3					S4	SS	13	100+				●	
		- split spoon refusal at 3.1 mbgs; auger to 6.1 mbgs											
4		- groundwater seepage at 3.7 mbgs											
5	Auger Solid Stem Auger (114mm OD)												Borehole loosely backfilled with auger cuttings at the time of the investigation
6													
7													
8	Auger Solid Stem Auger (114mm OD)	End of Borehole at 6.1 mbgs		21.20 6.10									Borehole loosely backfilled with auger cuttings at the time of the investigation

GROUNDWATER OBSERVATIONS		
DATE	DEPTH (m)	ELEV. (m)
26/06/23	3.70	▽ 23.6

RECORD OF BOREHOLE 26-03

CLIENT: Municipality of Cumberland County
 PROJECT: Geotechnical Engineering Services - New Fire Hall
 JOB#: 103744.004
 LOCATION: 1495 NS-242, River Hebert, NS

SHEET: 1 OF 1
 DATUM: CGVD2013
 BORING DATE: Jun 23 2026

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES				PENETRATION RESISTANCE (N), BLOWS/0.3m		SHEAR STRENGTH (Cu), kPA		ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	● PENETRATION RESISTANCE (N), BLOWS/0.3m	▲ DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m	+ NATURAL ⊕ REMOULDED				
											WATER CONTENT, %				
										W _p	W	W _L			
0	Auger Solid Stem Auger (114mm OD)	Ground Surface		27.30									M	Borehole loosely backfilled with auger cuttings at the time of the investigation	
		ROOTMAT		27.20											
		Compact, brown, moist, Silt and Sand, trace Gravel with coal fragments (GLACIAL TILL)		0.10	S1	SS	350	9	●						
1					S2	SS	500	19		●					
2					S3	SS	450	17	○ ●						
		Inferred Sandstone BEDROCK		25.20											
				2.10	S4	SS	450	100+							
3		- split spoon refusal at 2.7 mbgs; auger to 6.1 mbgs													
4		- groundwater seepage at 3.7 mbgs													
5															
6															
		End of Borehole at 6.1 mbgs		21.20											
				6.10											
7															
8															

GROUNDWATER OBSERVATIONS		
DATE	DEPTH (m)	ELEV (m)
26/06/23	3.70 ▽	23.6

GROUNDWATER OBSERVATIONS		
DATE	DEPTH (m)	ELEV (m)
26/06/23	3.70	▽ 23.6

RECORD OF BOREHOLE 26-04

CLIENT: Municipality of Cumberland County
 PROJECT: Geotechnical Engineering Services - New Fire Hall
 JOB#: 103744.004
 LOCATION: 1495 NS-242, River Hebert, NS

SHEET: 1 OF 1
 DATUM: CGVD2013
 BORING DATE: Jun 23 2026

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES				● PENETRATION RESISTANCE (N), BLOWS/0.3m ▲ DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m SHEAR STRENGTH (Cu), kPA + NATURAL ⊕ REMOULDED WATER CONTENT, % W_p — W — W_L	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m			
0	Auger Solid Stem Auger (114mm OD)	Ground Surface		26.70							Borehole loosely backfilled with auger cuttings at the time of the investigation
		ROOTMAT		26.60							
		Compact, brown, moist, Silty Sand and Gravel (FILL)		0.10							
		Compact, brown, moist, Silty Sand and Gravel (GLACIAL TILL)		26.40	S1	SS	500	14	●		
				0.30							
1					S2	SS	400	26	●		
2					S3	SS	500	25	●		
		Inferred Sandstone BEDROCK		24.70							
				2.00	S4	SS	500	100+		●	
3		- split spoon refusal at 2.7 mbgs; auger to 6.1 mbgs									
4											
5											
6											
		End of Borehole at 6.1 mbgs		20.60							
				6.10							
7											
8											

GEO - BOREHOLE LOG 103744.004 LOG_BH_GEOTECHNICAL INVESTIGATION 2026.06.23 REVA.GPJ GEMTEC 2018.GDT 7/27/26

RECORD OF BOREHOLE 26-05

CLIENT: Municipality of Cumberland County
 PROJECT: Geotechnical Engineering Services - New Fire Hall
 JOB#: 103744.004
 LOCATION: 1495 NS-242, River Hebert, NS

SHEET: 1 OF 1
 DATUM: CGVD2013
 BORING DATE: Jun 23 2026

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES				PENETRATION RESISTANCE (N), BLOWS/0.3m ▲ DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m	SHEAR STRENGTH (Cu), kPa + NATURAL ⊕ REMOULDED		WATER CONTENT, % W _p — W — W _L	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m						
0	Auger Solid Stem Auger (114mm OD)	Ground Surface		26.40										Borehole loosely backfilled with auger cuttings at the time of the investigation
		ROOTMAT		26.30										
		Loose, brown, moist, Silty Sand and Gravel (GLACIAL TILL)		0.10	S1	SS	600	8	●					
		Inferred Sandstone BEDROCK		25.90										
				0.50										
1					S2	SS	500	30	●					
2					S3	SS	500	34	●					
		- thin coal seam observed at 2.1 mbgs												
		- split spoon refusal at 2.6 mbgs			S4	SS	400	100+					●	
3	Auger Solid Stem Auger (114mm OD)													Borehole loosely backfilled with auger cuttings at the time of the investigation
4														
		- groundwater seepage at 4.3 mbgs												
5														
6														
		End of Borehole at 6.1 mbgs		20.30										
				6.10										
7														
8														

GROUNDWATER OBSERVATIONS		
DATE	DEPTH (m)	ELEV (m)
26/06/23	4.30	▽ 22.1

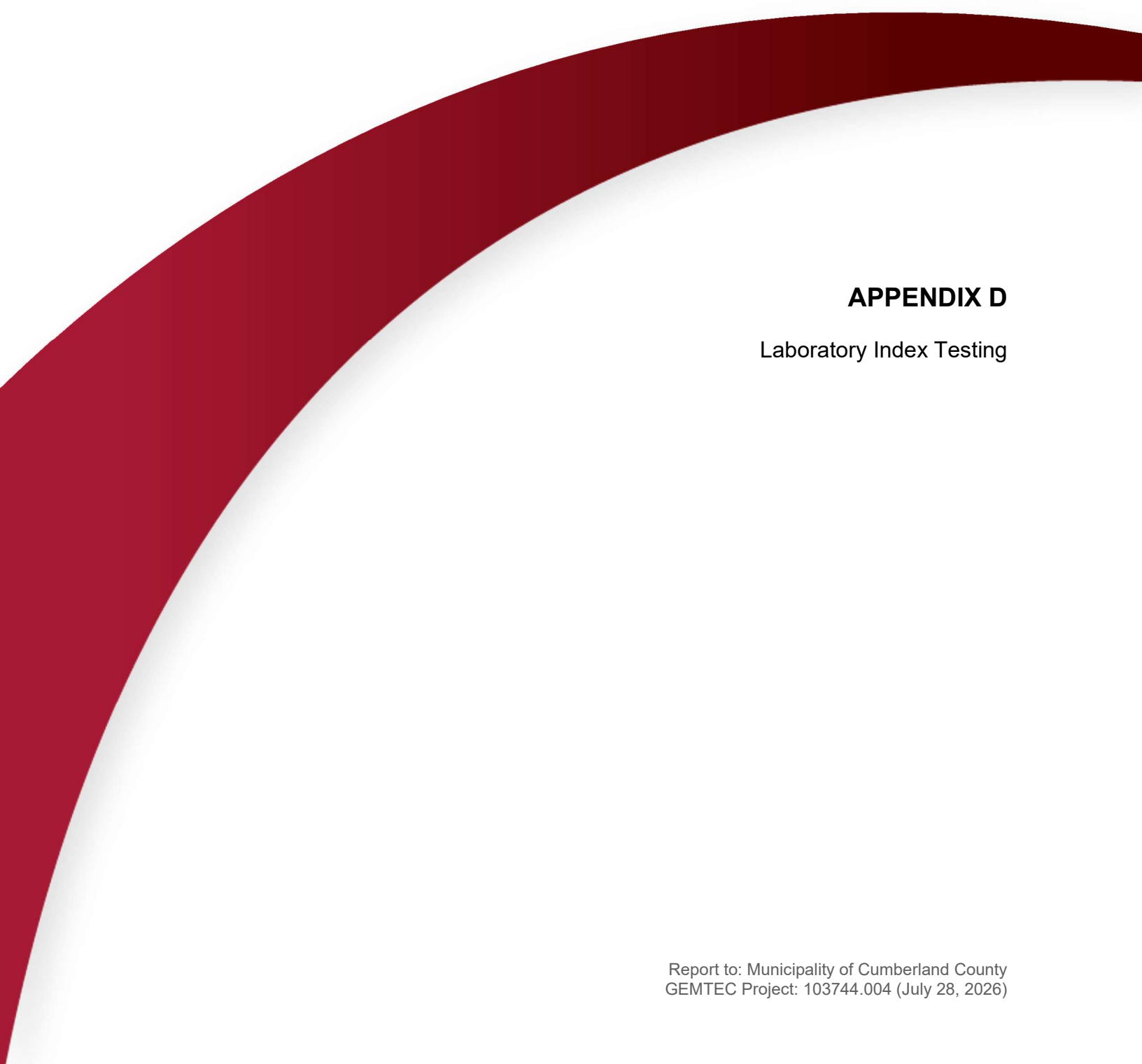
RECORD OF BOREHOLE 26-06

CLIENT: Municipality of Cumberland County
 PROJECT: Geotechnical Engineering Services - New Fire Hall
 JOB#: 103744.004
 LOCATION: 1495 NS-242, River Hebert, NS

SHEET: 1 OF 1
 DATUM: CGVD2013
 BORING DATE: Jun 23 2026

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES				PENETRATION RESISTANCE (N), BLOWS/0.3m DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m	SHEAR STRENGTH (Cu), kPA + NATURAL ⊕ REMOULDED WATER CONTENT, % W _p — W — W _L		ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m					
0	Auger Solid Stem Auger (114mm OD)	Ground Surface		27.20									Borehole loosely backfilled with auger cuttings at the time of the investigation
		ROOTMAT		27.10									
		Loose to very dense, brown, moist, Silty Sand and Gravel with coal fragments (GLACIAL TILL)		0.10	S1	SS	350	6	●				
1					S2	SS	450	17	●				
2		- split spoon refusal at 2.0 mbgs; auger to 2.1 mbgs - auger refusal at 2.1 mbgs End of Borehole at 2.1 mbgs		25.20 2.00	S3	SS	375	100+				●	
3													
4													
5													
6													
7													
8													

GEO - BOREHOLE LOG 103744.004 LOG_BH_GEOTECHNICAL INVESTIGATION 2026.06.23 REVA.GPJ GEMTEC 2018.GDT 7/27/26



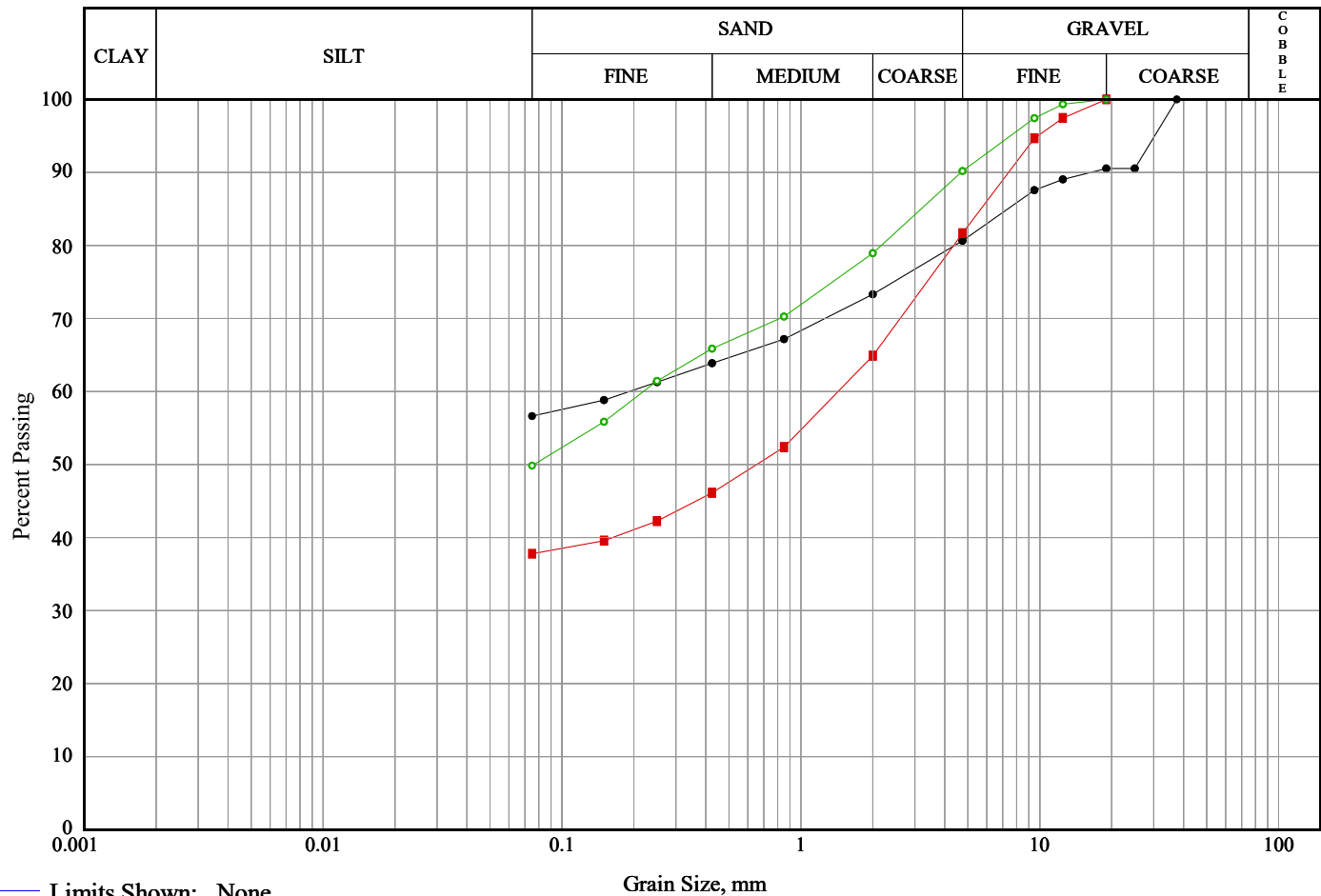
APPENDIX D

Laboratory Index Testing

	Client	Municipality of Cumberland County	Moisture Content and Density
	Project:	Geotechnical Engineering Services - New Fire Hall, 1495	
	Project #:	103744004	

Borehole: BH 26-01	Date/Time Sampled: 26/07/22 10:52:00 AM	Mass of Cont. + Wet Soil, g:	1243.70
Depth: 2.1m - 2.7m	Date/Time Tested: 26/07/22 10:55:21 AM	Mass of Cont. + Dry Soil, g:	1084.50
Sample: S4		Mass of Container, g:	299.50
Description: Glacial Till		Moisture Content, %:	20.28
		Sample Length, mm:	
		Sample Diameter, mm:	
		Sample Mass, g:	
		Sample Volume, mm ³	
		Wet Density, kg/m ³	
		Dry Density, kg/m ³	
Borehole: BH 26-01	Date/Time Sampled: 26/07/22 10:55:00 AM	Mass of Cont. + Wet Soil, g:	1263.60
Depth: 3.1m - 3.7m	Date/Time Tested: 26/07/22 10:55:21 AM	Mass of Cont. + Dry Soil, g:	1180.30
Sample: S5		Mass of Container, g:	302.00
Description: Glacial Till		Moisture Content, %:	9.48
		Sample Length, mm:	
		Sample Diameter, mm:	
		Sample Mass, g:	
		Sample Volume, mm ³	
		Wet Density, kg/m ³	
		Dry Density, kg/m ³	
Borehole: BH 26-03	Date/Time Sampled: 26/07/22 10:55:00 AM	Mass of Cont. + Wet Soil, g:	1431.50
Depth: 1.5m - 2.1m	Date/Time Tested: 26/07/22 10:55:21 AM	Mass of Cont. + Dry Soil, g:	1295.70
Sample: S3		Mass of Container, g:	300.40
Description: Glacial Till		Moisture Content, %:	13.64
		Sample Length, mm:	
		Sample Diameter, mm:	
		Sample Mass, g:	
		Sample Volume, mm ³	
		Wet Density, kg/m ³	
		Dry Density, kg/m ³	

 GEMTEC CONSULTING ENGINEERS AND SCIENTISTS	Client: Municipality of Cumberland County	Soils Grading Chart (D6913)
	Project: Geotechnical Engineering Services - New Fire Hall, 1495	
	Project #: 103744004	



Line Symbol	Sample	Borehole/ Test Pit	Sample Number	Depth	% Cob.+ Gravel	% Sand	% Silt	% Clay
—●—	Glacial Till	BH 26-01	S4	2.1m - 2.7m	19.4	24.0	56.6	
—■—	Glacial Till	BH 26-01	S5	3.1m - 3.7m	18.3	43.9	37.8	
—○—	Glacial Till	BH 26-03	S3	1.5m - 2.1m	9.8	40.3	49.8	

Line Symbol	USCS Classification	USCS Symbol	D ₁₀	D ₁₅	D ₃₀	D ₅₀	D ₆₀	D ₈₅	% 5-75µm
—●—	Sandy silt , some gravel	N/A	---	---	---	---	0.19	7.35	---
—■—	Sand and silt , some gravel	N/A	---	---	---	0.65	1.43	5.67	---
—○—	Silt and sand , trace gravel	N/A	---	---	---	0.08	0.22	3.19	---

Note: More information available upon request

experience • knowledge • integrity



civil	civil
geotechnical	géotechnique
environmental	environnement
structural	structures
field services	surveillance de chantier
materials testing	service de laboratoire des matériaux

expérience • connaissance • intégrité

